

Release notes for ENDF/B Development n-093\_Np\_235  
evaluation



April 26, 2017

- fudge-4.0 Warnings:

1. Cross section does not match sum of linked reaction cross sections  
*crossSectionSum label 0: total (Error # 0): CS Sum.*

**WARNING: Cross section does not match sum of linked reaction cross sections! Max diff: 0.45%**

2. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 1 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [nubar]): / Form 'eval': (Error # 0): Condition num.*

**WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small**

3. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 2 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [nubar]): / Form 'eval': (Error # 0): Condition num.*

**WARNING: Ratio of smallest/largest eigenvalue (1.507780e-09) is too small**

4. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 3 (total): / Form 'eval': / Component 0 (Error # 0): Condition num.*

**WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small**

5. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 3 (total): / Form 'eval': / Component 1 (Error # 0): Condition num.*

**WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small**

6. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 4 (n + Np235): / Form 'eval': / Component 0 (Error # 0): Condition num.*

**WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small**

7. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 4 (n + Np235): / Form 'eval': / Component 1 (Error # 0): Condition num.*

**WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small**

8. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 8 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission]): / Form 'eval': / Component 0 (Error # 0): Condition num.*

**WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small**

9. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 8 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission]): / Form 'eval': / Component 1 (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

10. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 9 (n + (Np235\_e1 -> Np235 + gamma)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (8.611685e-11) is too small

11. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 10 (n + (Np235\_e2 -> Np235 + gamma)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (1.399559e-09) is too small

12. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 12 (n + (Np235\_e4 -> Np235 + gamma)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (2.218730e-09) is too small

13. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 13 (n + (Np235\_e5 -> Np235 + gamma)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (7.530155e-09) is too small

14. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 14 (n + (Np235\_e6 -> Np235 + gamma)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (3.296790e-09) is too small

15. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 15 (n + (Np235\_e7 -> Np235 + gamma)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (5.637856e-09) is too small

16. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 16 (n + (Np235\_c -> Np235 + gamma)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

17. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.  
*Section 17 (Np236 + gamma): / Form 'eval': / Component 0 (Error # 0): Condition num.*
- ```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```
18. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.  
*Section 17 (Np236 + gamma): / Form 'eval': / Component 1 (Error # 0): Condition num.*
- ```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```
19. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.  
*Section 18 (n + Np235 [angular distribution]): / Form 'eval': (Error # 1): Condition num.*
- ```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```
20. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.  
*Section 19 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [spectrum]): / Form 'eval': (Error # 0): Condition num.*
- ```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```
21. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.  
*Section 20 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [spectrum]): / Form 'eval': (Error # 0): Condition num.*
- ```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```
22. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.  
*Section 21 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [spectrum]): / Form 'eval': (Error # 0): Condition num.*
- ```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```
23. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.  
*Section 22 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [spectrum]): / Form 'eval': (Error # 0): Condition num.*
- ```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

- fudge-4.0 Errors:

1. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Decay product: gamma\_a / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (140000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)
2. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (140000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)  
**WARNING:** Domain doesn't match the cross section domain: (200000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)  
**WARNING:** Domain doesn't match the cross section domain: (170000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)  
**WARNING:** Domain doesn't match the cross section domain: (250000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)  
... plus 3 more instances of this message
3. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Decay product: gamma\_b / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (200000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)
4. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Decay product: gamma\_c / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (170000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)
5. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Decay product: gamma\_d / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (250000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)
6. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Decay product: gamma\_e / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (200000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)
7. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Decay product: gamma\_f / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (400000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)
8. Energy range of data set does not match cross section range  
*reaction label 8: n + (Np235\_c ->Np235 + gamma) / Product: Np235\_c / Decay product: gamma\_g / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (250000.0 -> 20000000.0) vs (110946.0 -> 20000000.0)
9. Calculated and tabulated Q values disagree.  
*reaction label 9: n[multiplicity:'2'] + Np234 + gamma (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -6909788.772583008 eV vs -6983120. eV!

10. Energy range of data set does not match cross section range  
*reaction label 9: n[multiplicity:'2'] + Np234 + gamma / Product: gamma\_a / Multiplicity: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (7500000.0 -> 20000000.0) vs (7013090.0 -> 20000000.0)

11. Energy range of data set does not match cross section range  
*reaction label 9: n[multiplicity:'2'] + Np234 + gamma / Product: gamma\_a / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (7500000.0 -> 20000000.0) vs (7013090.0 -> 20000000.0)

12. Energy range of data set does not match cross section range  
*reaction label 9: n[multiplicity:'2'] + Np234 + gamma / Product: gamma\_b / Multiplicity: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (7500000.0 -> 20000000.0) vs (7013090.0 -> 20000000.0)

13. Energy range of data set does not match cross section range  
*reaction label 9: n[multiplicity:'2'] + Np234 + gamma / Product: gamma\_b / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (7500000.0 -> 20000000.0) vs (7013090.0 -> 20000000.0)

14. Energy range of data set does not match cross section range  
*reaction label 9: n[multiplicity:'2'] + Np234 + gamma / Product: gamma\_c / Multiplicity: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (7500000.0 -> 20000000.0) vs (7013090.0 -> 20000000.0)

15. Energy range of data set does not match cross section range  
*reaction label 9: n[multiplicity:'2'] + Np234 + gamma / Product: gamma\_c / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (7500000.0 -> 20000000.0) vs (7013090.0 -> 20000000.0)

16. Calculated and tabulated Q values disagree.  
*reaction label 10: n[multiplicity:'3'] + Np233 + gamma (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -12974209.72973633 eV vs -1.30475e7 eV!

17. Energy range of data set does not match cross section range  
*reaction label 10: n[multiplicity:'3'] + Np233 + gamma / Product: gamma\_a / Multiplicity: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (13500000.0 -> 20000000.0) vs (13103500.0 -> 20000000.0)

18. Energy range of data set does not match cross section range  
*reaction label 10: n[multiplicity:'3'] + Np233 + gamma / Product: gamma\_a / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)*

WARNING: Domain doesn't match the cross section domain: (13500000.0 -> 20000000.0) vs (13103500.0 -> 20000000.0)

19. Energy range of data set does not match cross section range  
*reaction label 10: n[multiplicity:'3'] + Np233 + gamma / Product: gamma\_b / Multiplicity: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (13500000.0 -> 20000000.0) vs (13103500.0 -> 20000000.0)

20. Energy range of data set does not match cross section range  
*reaction label 10: n[multiplicity:'3'] + Np233 + gamma / Product: gamma\_b / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)*

**WARNING:** Domain doesn't match the cross section domain: (13500000.0 -> 20000000.0) vs (13103500.0 -> 20000000.0)

21. Calculated and tabulated Q values disagree.  
*reaction label 12: Np236 + gamma (Error # 0): Q mismatch*

**WARNING:** Calculated and tabulated Q-values disagree: 5810013.458068848 eV vs 5736680. eV!

22. Multiplicity does not match sum of linked product multiplicities!  
*multiplicitySum label 10: n + (Np235\_c ->Np235 + gamma) total gamma multiplicity (Error # 0): summedMultiplicityMismatch*

**WARNING:** Multiplicity does not match sum of linked product multiplicities! Max diff: 22.09%

23. Multiplicity does not match sum of linked product multiplicities!  
*multiplicitySum label 11: n[multiplicity:'2'] + Np234 + gamma total gamma multiplicity (Error # 0): summedMultiplicityMismatch*

**WARNING:** Multiplicity does not match sum of linked product multiplicities! Max diff: 85.55%

24. Multiplicity does not match sum of linked product multiplicities!  
*multiplicitySum label 12: n[multiplicity:'3'] + Np233 + gamma total gamma multiplicity (Error # 0): summedMultiplicityMismatch*

**WARNING:** Multiplicity does not match sum of linked product multiplicities! Max diff: 124.83%

25. Calculated and tabulated Q values disagree.  
*fissionComponent label 0: /reactionSuite/fissionComponents/fissionComponent[@label='0'] (Error # 0): Q mismatch*

**WARNING:** Calculated and tabulated Q-values disagree: 219881784407.7732 eV vs 1.90695e8 eV!

26. Calculated and tabulated Q values disagree.  
*fissionComponent label 1: /reactionSuite/fissionComponents/fissionComponent[@label='1'] (Error # 0): Q mismatch*

**WARNING:** Calculated and tabulated Q-values disagree: 219881784407.7732 eV vs 1.90695e8 eV!

27. Calculated and tabulated Q values disagree.  
*fissionComponent label 2: /reactionSuite/fissionComponents/fissionComponent[@label='2'] (Error # 0): Q mismatch*

**WARNING:** Calculated and tabulated Q-values disagree: 219881784407.7732 eV vs 1.90695e8 eV!

28. Calculated and tabulated Q values disagree.  
*fissionComponent label 3: /reactionSuite/fissionComponents/fissionComponent[@label='3']*  
*(Error # 0): Q mismatch*

```
WARNING: Calculated and tabulated Q-values disagree: 219881784407.7732 eV vs 1.90695e8 eV!
```

29. A covariance matrix was not positive semi-definite, so it has negative eigenvalues.  
*Section 18 (n + Np235 [angular distribution]): / Form 'eval': /LegendreLValue L=1 vs 1* (Error # 0): Bad evs

```
WARNING: 11 negative eigenvalues! Worst case = -5.154487e-05
```

- njoy2012 Warnings:

- Evaluation has no resonance parameters given  
*unresr...calculation of unresolved resonance cross sections (0): No RR*

```
---message from unresr---mat 9340 has no resonance parameters
copy as is to nout
```

- In some evaluations, the partial fission reactions MT=19, 20, 21, and 38 are given in File 3, but no corresponding distributions are given. In these cases, it is assumed that MT=18 should be used for the fission neutron distributions.  
*heatr...prompt kerma (0): HEATR/hinit (3)*

```
---message from hinit---mt19 has no spectrum
mt18 spectrum will be used.
```

- Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (1): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 16 does not give recoil za= 93234
one-particle recoil approx. used.
```

- Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (2): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 17 does not give recoil za= 93233
one-particle recoil approx. used.
```

- Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (3): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 51 does not give recoil za= 93235
one-particle recoil approx. used.
```

- Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (4): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 52 does not give recoil za= 93235
one-particle recoil approx. used.
```

- Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (5): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 53 does not give recoil za= 93235
one-particle recoil approx. used.
```

8. Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (6): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 54 does not give recoil za= 93235
one-particle recoil approx. used.
```

9. Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (7): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 55 does not give recoil za= 93235
one-particle recoil approx. used.
```

10. Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (8): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 56 does not give recoil za= 93235
one-particle recoil approx. used.
```

11. Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (9): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 57 does not give recoil za= 93235
one-particle recoil approx. used.
```

12. Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (10): HEATR/hinit (4)*

```
---message from hinit---mf6, mt 91 does not give recoil za= 93235
one-particle recoil approx. used.
```

13. Recoil is not given, so one-particle recoil approximation used.  
*heatr...prompt kerma (11): HEATR/hinit (4)*

```
---message from hinit---mf6, mt102 does not give recoil za= 93236
photon momentum recoil used.
```

14. There is a problem with the fission energy release.  
*heatr...prompt kerma (24): HEATR/nheat (3)*

```
---message from nheat---changed q from 1.906950E+08 to 1.856031E+08
for mt 18
```

15. Evaluation has no resonance parameters given  
*purr...probabalistic unresolved calculation (0): No RR*

```
---message from purr---mat 9340 has no resonance parameters
copy as is to nout
```